Answer each question in the provided blue book and put a box around each final answer. Please try to keep your answers in order (you can skip pages in your blue book). Simplify all fractions and radical expressions. Good luck!

1. (4 points) Perform the indicated operation(s) and simplify as much as possible.

$$\frac{\frac{1}{2}-\frac{1}{7}}{1-\frac{2}{7}}$$

2. (4 points) Simplify the expression and eliminate any negative exponents.

$$\left(\frac{2a^{-1}b}{a^3b^{-2}}\right)^{-4}$$

3. (4 points) Find all real solutions to the equation.

$$x(x+5)=1$$

4. (4 points) Performt the indicated operation(s) and simplify as much as possible.

$$\frac{x^2+2x-3}{x^2+8x+16}\cdot\frac{3x+12}{x-1}$$

5. (4 points) Evaluate $25^{-3/2}$.

6. (4 points) Find all real solutions to the equation.

$$\frac{1}{2}x+\frac{5}{2}=7-\frac{1}{4}x$$

7. (4 points) Perform the indicated operation(s) and simplify completely as one rational expression.

$$\frac{1}{x^2-2x}-\frac{1}{x^2+2x}$$

8. Give an equation of the line through $(3,-1)$ that is ...
   (a) (2 points) horizontal.
   (b) (2 points) vertical.

9. (4 points) Give an equation of the line through $(-6,8)$ that is paqrallel to the line $5x+4y=3$.

10. (4 points) Find all real solutions to the equation.

$$x-\sqrt{2x+31}=2$$

11. (4 points) Use interval notation to state the domain of the function.

$$f(x)=\frac{\sqrt{x+8}}{2x-1}$$

12. (4 points) Let $f(x)=x^2+3x$. Evaluate and simplify the expression $f(a+h)-f(a)$.

13. Let $f(x)=2x-5$ and let $g(x)=3-x^2$. Evaluate and simplify the following expressions.
   (a) (2 points) $f(g(4))$
   (b) (2 points) $g(f(x))$

14. (4 points) The angle of elevation to the top of a building is found to be 26° at a distance of 45 meters from the building. Find the height of the building (you may leave your answer in terms of $\sin, \cos, \tan$, etc).

15. (a) (2 points) Find the exact value of $\cos\left(\frac{4\pi}{3}\right)$.

    (b) (2 points) Suppose θ is an angle that terminates in quadrant I and $\sin\theta = \frac{\sqrt{5}}{5}$. Find $\tan\theta$ and simplify your answer.

16. (4 points) Find all real solutions to the equation.

$$e^{7-5x} = 1$$

17. (4 points) Evaluate $\log_2(2\sqrt{2})$.

18. (4 points) Sketch the graph

$$y = \ln(x-3) - \ln 2$$

not by plotting points but by starting with the graph of a standard function and applying transformations. Label all asymptotes and intercepts.

19. (a) (2 points) Convert 72° to radians.

    (b) (2 points) Convert $\frac{4\pi}{9}$ radians to degrees.

20. (4 points) Let $f(x) = \frac{2}{5x+3}$. Find $f^{-1}(x)$.

21. (4 points) Find all real solutions to the equation.

$$x(2x-1) + (2x-1)^2 = 0$$

22. (4 points) Sketch the graph of $f(x) = 4 + 3x - x^2$. Label the vertex and all intercepts.

23. (4 points) Use interval notation to state the solutions to the inequality.

$$x^2 \leq 2x + 15$$

24. (4 points) Sketch the graph of the piecewise defined function.

$$f(x) = \begin{cases} 1 - \frac{1}{2}x & \text{if } x \leq -2 \\ x^2 & \text{if } -2 < x \leq 1 \\ 2x - 2 & \text{if } x > 1 \end{cases}$$

25. (4 points) Sketch the graph of the polynomial and label all intercepts.

$$P(x) = x^5 - 2x^4 - 24x^3$$